AIR BLOWER FOR EXTINGUISHING FIRES AND METHOD FOR EXTINGUISHING FIRES

BACKGROUND OF THE INVENTION - FIELD OF THE INVENTION

A device for extinguishing fires and a method of extinguishing fires.

BACKGROUND OF THE INVENTION - DESCRIPTION OF THE PRIOR ART

Every year, wild fires burn across the United States. Vast areas of forest land in the American mid-west such as Montana, Idaho and Wyoming burn every year. These fires are started by campers being careless with camp fires and lightning. The wild fires often spread quickly and threaten towns, homes and property.

In the year 2000 alone, 27,000 fire fighters combated 73,000 separate fires. These fires claimed over 6.3 million acres. The cost of fighting these wild fires is estimated to be 1 billion dollars. The total economic loss from fires, including property damages and loss of businesses, is estimated to be 10 billion dollars. More importantly, every year, many fire- fighters lose their lives combating the blazes.

Many types of equipment are used to combat wild fires. An effective tool is the use of airplanes to drop fire retardant chemicals and water on the affected area. Water is used to extinguish the blaze, whereas fire retardant chemicals are used to stop the advancement of the fire. Regardless of the advancement in firefighting equipment, the most work is done by fire- fighters on the ground.

Firefighters combat the blaze by extinguishing the fire directly or starting a backfire. A backfire is the controlled burn of forest in advance of the forest fire. By burning the land, a fire line is created. When the forest fire advances to the area burnt by the backfire, it can no longer advance for lack of fuel. Once a fire line is created by a backfire, the main blaze is allowed to burn itself out. This method is effective because the firefighters do not have to come in close proximity to the wild fire. However, backfires must be properly executed or they will become as great a problem as the original fire. It is important that the backfire advance in a direction toward the main forest fire. A sudden shift in winds can prevent the proper advancement of a backfire.

Firefighters on the ground use tools such as chain saws to create proper conditions for starting a backfire. Trees and heavy brush are cut and set ablaze when the conditions are optimal to cause a backfire to advance in a direction toward the main fire.

The prior art discloses several different types of apparatus using the exhaust of an engine to combat a fire. One such example is disclosed in U.S. Patent 4,614,237 (*Colodner et al.*). *Colodner et al.* discloses a combination fire extinguisher and blower. An internal combustion engine powers the blower and includes a hose coupled to the exhaust pipe cover and the air inlet of the blower. The hose pipe exhausts gas into the blower when such gas is needed to extinguish a fire. A second hose is provided on the blower having one end secured to a sleeve fastened to an air cooled nozzle and is used to blow air or exhaust gas, whenever needed.

U.S. Patent 5,848,652, issued to *Bennett*, discloses a fire suppression system for an engine compartment of a vehicle. A remotely controlled throttle valve disposed within the exhaust duct of the engine selectively diverts exhaust gas through a bypass duct for mixing with ventilation air flow. By mixing the gases and the air flow, the oxygen content is reduced in the air flow over the engine. The reduced oxygen content will inhibit combustion.

Another prior art device is disclosed in U.S. Patent 5,154,238, issued to *Buchan*. *Buchan* discloses a fire protection apparatus having spray nozzles oriented adjacent engines of an airplane. Quick connect coupling secure a conduit to the spray nozzles and deliver a fire extinguishing agent such as carbon dioxide directly to the engine to extinguish a fire.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a firefighting tool that can be used for both extinguishing fires and starting backfires.

It is another object of the invention to provide a firefighting tool that can be carried on the firefighter's back to leave the hands free for other tasks.

It is yet another object of the invention to provide a lightweight inexpensive but effective firefighting tool.

It is another object of the invention to provide a method for extinguishing fires including operating a blower having an engine and an output hose creating an output of air through the output hose to form an airstream, diverting exhaust from the engine into said airstream and directing the airstream at the fire.

It is still another object of the invention to provide a method for starting backfires including operating a blower, the blower having an engine and an output hose, creating an output of air through the output hose to form an airstream, starting a backfire, and using the airstream of the blower to promote the spread of the backfire and direct the advancement of the backfire.

It is another object of the invention to provide a device for extinguishing fires or starting backfires having an engine to create an air flow, an output hose to direct the air flow and a valve for selectively adding exhaust from the engine to the air flow.

It is yet another object of the invention to provide a diverter valve within a Y-shaped valve of a blower, the valve acts to direct the exhaust of the blower to the output hose of the blower or to an exhaust outlet.

These and other objects of the invention will be apparent to one of ordinary skill in the art after reading the description of the invention that follows.

The invention resembles a blower used by commercial landscapers. The device has an engine mounted on a frame. Shoulder straps attached to the frame allow the user to wear the device on his back. This leaves the hands free to operate the blower or other tools such as a chain saw or perform other tasks. Also, wearing the device on the back makes it easier to transport the device over long distances to the source of the fire or backfire to be started.

The device generates a stream of air at high speeds. This stream of air can be used to blow out a fire when the air is directed at the source of the fire. When used to extinguish a fire, exhaust from the engine is diverted through a Y-shaped valve into the airstream. This has a

twofold affect as it increases the speed of the airstream and increases the amount of carbon monoxide and carbon dioxide in the airstream to starve the fire of oxygen.

The device can also be used to start backfires. After the appropriate location of a backfire has been selected, a fire is started. The airstream created by the device can be used to both encourage the propagation of the fire and direct the fire towards the main wild fire. The ability to quickly spread the backfire in the proper direction is imperative because a sudden change in wind direction or other weather conditions could cause the backfire to become as big a problem as the original fire.

In one aspect of this invention there is provided a method of controlling a fire, comprising the steps of providing an engine having an engine exhaust; providing a blower, with an output port, connected to the engine; driving the blower by the engine to provide an output stream of air through the output port; removing at least part of the air stream from the blower; and directing the blower air stream to the fire by means of the output port.

In another aspect of this invention there is provided a method of providing a controlled or backfire, comprising the steps of starting a fire; providing a device capable of producing an air stream; producing the air stream by means of the device; directing the air stream at the fire, and causing the fire to spread in a controlled manner.

In yet another aspect of this invention there is provided a valve. The valve includes an input port and at least two output ports. There is also provided a planar valve member for selectively diverting gas into one of the two output ports. Additionally, there is a planar valve

member pivotally connected at the junction of the inlet and two exhaust outlet. There is also means for pivotally moving the planar valve member from a first position to a second position to selectively block the flow of the gas out between the first or second exhaust output ports.

In still another aspect of this invention there is a device of the type for extinguishing fires, starting backfires or a control burn. This device comprises engine and blower means. The engine means operates the blower means to create an air stream. An air output hose is provided for directing the air stream at the fire. At least one hose is provided for selectively diverting the exhaust into the air stream.

In still a further aspect of this invention there is provided a valve having an inlet port and two outlet ports. The valve comprises a shutter body and a pivot pin. The shutter body is secured to the pivot pin. A valve rod is connected to and extending from the pivot pin. A cable is attached to the valve rod and moves the valve shutter body from a first position, blocking one outlet port, to a second position unblocking the first outlet port and blocking the second outlet port.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of the device;

FIG. 2 is a view of the left side of the device;

FIG. 3 is a view of the right side of the device;

FIG. 4 is a view of the Y-shaped valve;

FIG. 5 is a view of the Y-shaped valve with portions cut away to show operation of the valve; and

FIG. 6 is a view of the valve within the Y-shaped valve.

DETAILED DESCRIPTION OF THE INVENTION

The device is clearly depicted in FIG. 1. The device is a blower **10** having an engine **11** to create an airstream. The blower **10** is attached to a frame **12**, as is well known in the art. The blower **10** may have an air outlet hose **18**. The air outlet hose **18** allows the user to direct the generated airstream.

A Y-shaped valve **30** comprising an input leg **33** and first and second output exhaust legs **34** and **36**, respectively. Exhaust, created by the internal combustion of the engine **11**, may flow through an exhaust output pipe **31** which is connected to the input leg **33** of the Y-shaped valve **30**. The exhaust output pipe **31** connects to the exhaust input leg **33** (FIGS. 5 and 6) of a Y-shaped valve **30** comprising an input leg **33**, and a first and second output exhaust legs **34** and **36**, respectively. A conduit **22** may be connected to a port (not shown) in the blower **10** approximately 180° before the outlet hose **18**. Conduit **22** may be coupled by a T-connection **29** (FIGS. 1 and 2) to the engine exhaust pipe **31** (FIG. 4). The Y-shaped valve **30** receives the supply of air from the blower **10** from T couple **29**. The air cools and speeds the flow of the exhaust gas as will be explained later.

The exhaust gas and air enters the Y-shaped valve **30** and may either exit the Y-shaped valve **30** through the first exhaust outlet leg **34** (FIGS. 5 and 6) to the atmosphere or may

be diverted to the second output exhaust leg **36** of the Y-shaped valve **30** into the blower **10** where the air stream is about to exit outlet hose **18**.

FIG. 2 shows the left side of the device. As may be seen in this view, the device has shoulder straps **14** attached to the frame **12** to allow the operator to carry the device on his back. The orientation and location of the Y-shaped valve **30** prevents the exhaust exiting either of the two exhaust legs **34** or **36** from interfering with the breathing of the operator and propels the carbon monoxide further away from the operator so that it is less likely that the operator will inhale this noxious gas. Additionally, the air mixture with the exhaust gas materially reduces the temperature of the exhaust thereby reducing heat buildup on metal parts. This, in turn, reduces the possibility that the operator's hands or body will be burned.

The right side of the device, as shown in FIG. 3, shows the air outlet **18** of the blower **10**. The engine exhaust may be diverted by the Y-shaped valve **30** through the second exhaust leg **36** which may be coupled to an exhaust delivery hose **52**. The other end of the delivery hose **52** is connected to a port or opening **53** in the housing of the blower **10** at a point just before the air outlet **18**. In this way, exhaust gasses may be delivered into the airstream created by the blower **10** thereby increasing the flow of the output gases as well as adding such flame retarding exhaust constituents as carbon monoxide and carbon dioxide to the exhaust stream.

The diversion of the exhaust is more fully explained with reference to FIG. 4. The exhaust intake leg **31** of the Y-shaped valve **30** may be selectively connected to the first or second exhaust outlet leg **34** or **36**, respectively. Attached to the second exhaust outlet leg **36** is, as

previously discussed, the exhaust delivery hose **52**. A control element such as a flapper valve or shuttle **62** pivotally secured by a pivot pin **64** or the like at the Y junction of the Y-shaped valve **30**. The valve member **62** may be used to determine whether the exhaust and air combination passes to outlet hose **18** of blower **10** or passes directly through the first exhaust leg **34**. Alternatively, well known valve constructions may be used in place of the Y-shaped valve **30** (e.g., ball or slider valves).

A valve rod **72** may connected, at one end, to a flexible valve actuating cable **45**. Such cables are well known in the art. A bracket **42** may be secured to the second exhaust output leg **36**. A cable guide **49**, again, well known in the art, may be attached to the bracket **42** for receiving and supporting the cable **45**. The cable **45** extends through the guide **49**. The guide **49** insures smooth operation of the cable **45**, as is well known in the art. Movement of the cable **45**, in turn, moves the rod **72** to affect movement of the flapper valve **62**.

The combination of the Y-shaped valve **30** with the flapper valve **62** is better seen with reference to FIGS. 5 and 6 which provide a sectional view of the Y-shaped valve **30** in the vicinity of the flapper valve **62**. Thus, as previously indicated the Y-shaped valve **30** has therewithin a shutter valve body **62** connected to a pivot pin **64**. The valve rod **72** is connected to the pivot pin **64**. Movement of the rod **72** may be caused by actuation of the cable **45**. The shutter **62** may be connected to the pivot pin **64** to move the shutter from a first position, shown in FIG. 5, to a second position, shown in phantom in FIG. 5 in the direction of the arrow **63**. In the first position, the exhaust and air coming through exhaust intake leg **32** is diverted into the

second exhaust leg **36**. The exhaust delivery hose **52** then carries the mixture of exhaust and air from the second exhaust leg **36** to the juncture **53** with the blower **10** just before the air outlet hose **18**. When the shutter valve **62** is moved to the second position (shown in phantom) the exhaust and air combination flows directly from the exhaust pipe **32** through the first exhaust outlet pipe **34**.

In operation, the blower **10** generates a stream of air which exits blower port **18** at a substantially constant velocity. When the Y-valve **30** diverts the mixture of exhaust and air through conduit **52** and into the exit port **18**, the resulting stream is increased in velocity. Further, the air propels the air-engine exhaust at greater velocity than if the exhaust alone were used.

The combined exhaust and air stream, exiting the blower port **18**, can be used to blow out a fire when the air is directed at the source of the fire. When used to extinguish a fire, exhaust from the engine **11**, mixed with air from the blower **10**, is diverted through the Y-shaped valve **30** into the blower airstream just before the output port **18**. This has a twofold affect: it increases the speed of the airstream and increases the amount of carbon monoxide and carbon dioxide in the airstream to help starve the fire of oxygen.

The device can also be used to start backfires. After the appropriate location of a backfire has been selected, a fire is started. The airstream (without the addition of the exhaust) created by the blower **10** can be used to both encourage the propagation of the fire and direct the fire towards the main wild fire. The ability to quickly spread the backfire in the proper direction is imperative because a sudden change in wind direction or other weather conditions could cause

the backfire to become as big a problem as the original fire. In the same way, the blower **10** can be used to perform a control burn. A control burn is one in which a fire is intentionally maintained to clear a predetermined area.

Yet another use for this device is contain small chemical or oil spills by using the blower **10** to divert the liquid to a safer area.

While the invention has been described with reference to a preferred embodiment, modifications and variations would be obvious to one of ordinary skill in the art without departing from the scope of the invention. The exact description of the invention is not intended to be limiting in any way but to cover these modifications and variations.